

REMARKS

Applicants appreciate the Examiner's thorough examination of the subject application and request reconsideration of the subject application based on the foregoing amendments and the following remarks.

Claims 1-10 are pending in the subject application.

Claims 1-10 stand rejected under 35 U.S.C. §103.

Claim 1 was amended to more clearly claim Applicants' invention. The amendments to the claims are supported by the originally filed disclosure.

35 U.S.C. §103 REJECTIONS

Claims 1-10 stand rejected under 35 U.S.C. §103 as being unpatentable over Mase et al. [USP 5,666,173; "Mase"] in view of Asao et al. [USP 6,195,147; "Asao"]. Applicants respectfully traverses as discussed below. Because claim(s) was/ were amended in the instant amendment, the following discussion refers to the language of the amended claims, however, only those amended features specifically relied upon to distinguish the claimed invention from the cited prior art shall be considered as being made to overcome the cited reference.

Applicants claim, claim 1, a liquid crystal optical apparatus that includes a pair of substrates, a liquid crystal layer provided between the pair of substrates, a plurality of first electrodes provided on one of the pair of substrates, and at least one second electrode provided on the other of the pair of substrates. The liquid crystal layer also is formed of a liquid crystal

material in which an aligning direction of liquid crystal molecules continuously changes in accordance with a voltage applied thereto. Further, a frame period for applying a signal to the liquid crystal layer includes a first period in which a voltage is applied to the at least one second electrode, and a write signal for writing information to the liquid crystal layer is applied to one of the plurality of first electrodes, and a second period in which a voltage is applied to the at least one second electrode, and a reset signal for deleting the information written in the liquid crystal layer in the first period is applied to the one of the plurality of first electrodes.

Mase describes an electro-optical device including a pair of device; each device includes a pair of substrates between which is sandwiched an electro-modulating layer, a liquid crystal composition, and a means for orientating the liquid crystal composition. More specifically Mase uses a ferroelectric liquid crystal (see figure 4 thereof), and discloses a gradation display method wherein the first and second devices are combined. One of the devices is controlled by time sharing as described in the Abstract of Mase [see the description "the light transmission factor of the second device changes with time rotationally in the ratios of approximately 2^0 to 2^1 to...to 2^n (n is an arbitrary natural number)]. Also, figure 8 in Mase clearly shows the use of the combination with time-sharing gradation as described above.

The present invention relates to a liquid crystal optical apparatus wherein one frame is divided into two periods, as shown in Figure 3 of the subject application. A voltage, for instance V_a , is applied to the pixel in order to reset the pixel. Furthermore, the present invention provides an arrangement with an analogue gradation display by controlling the voltage to control the angle

between a molecular axis of the ferroelectric liquid crystal and the polarization axis of the polarization plate. Mase does not disclose, teach nor suggest the above mentioned feature of the present invention.

As to Asao, there is described a liquid crystal device that is constituted by a pair of substrates and a liquid crystal disposed between the substrates. Also, Asao discloses an apparatus for performing an analogue gradation display by controlling a ratio of two memory states of the ferroelectric liquid crystal, as shown in Figures 3A to 5C and Figure 14 of Asao, that corresponds to the one memory state and the another memory state of Figure 7 of the subject application.

Figure 11 of Asao also shows an arrangement having a panel of a simple matrix type, where figures 12 and 13 thereof show driving waveforms. Figures 19-22 thereof show active driving to show that Asao is not limited to the simple matrix type panel. Figure 22C thereof shows a voltage to be applied to a pixel, and Figure 22D thereof shows an amount of transmission of light thereof.

Asao discloses that "As shown in FIG. 22C, an applied voltage through two frame periods comprises a positive voltage V_s in a first frame period and a negative voltage $-V_s$ (having the same amplitude as V_s). In the first frame period, as shown in FIG. 22D, an optical state is obtained depending on V_s , and in the second frame period, depending on $-V_s$, an optical state is obtained". It is not clear that the object of applying $-V_s$ is to cancel the influence of V_s or to show a different display state, such as an OFF state.

As indicated herein, the liquid crystal optical apparatus of the present invention provides an arrangement wherein one frame is divided into two periods, the initial period being for applying a voltage, for instance V_a , to a pixel in order to perform the display of the initial period, and in the next period a voltage of $-V_a$ is applied in order to cancel the influence of V_a .

Thus, Asao is completely different from the present invention in that one frame is divided into two periods, even if the Examiner considers that in the reference a first frame period and a second frame period can constitute one frame.

Further, Asao discloses an analogue gradation display by changing a ratio between two memory states. The present invention, however, is directed to an analogue gradation display by controlling a voltage to control the angle between a molecular axis of the ferroelectric liquid crystal and the polarization axis of the polarization plate, as shown in Figure 4.

Notwithstanding the foregoing remarks distinguishing the present invention from the combination of references, in the interests of advancing prosecution, Applicants are amending claim 1 in the foregoing amendment to more clearly claim the present invention. In the foregoing amendment, claim 1 was amended to recite inter alia --a liquid crystal material in which an aligning direction of liquid crystal molecules continuously changes in accordance with a voltage applied thereto--. Applicants respectfully submit that with this amendment the the liquid crystal optical apparatus of claim 1 is clearly distinguishable from the combination of Mase and Asao.

In this regard, Applicants would offer the following additional remarks. Asao controls a ratio of two memory states, while the liquid crystal optical apparatus of the present invention

continuously controls the aligning axis of liquid crystal molecules. Thus, the aligning state of liquid crystal molecules of the present invention is totally different from Asao.

Additionally, Asao teaches applying voltages V_s and $-V_s$ in two frame periods, and can be interpreted as performing different displays in the V_s and $-V_s$ states. The present invention, however, is completely different from the reference, wherein one frame is divided into two periods to apply a voltage V_a and another voltage $-V_a$ to cancel the voltage V_a .

In sum, the references alone or in combination do not disclose, teach nor suggest all the features comprising the liquid crystal optical apparatus of claim 1. Applicants also submit that the references, alone or in combination, also do not provide any teaching, suggestion nor offer any motivation for modifying the principal reference, Mase, so as to yield the liquid crystal optical apparatus of claim 1.

Each of claims 2-10 depends directly or ultimately from claim 1. Thus, each of claims 2-10 are believed to be allowable at least because of their dependency from a base claim that is believed to be allowable.

As provided in MPEP 2143.01, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F. 2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F. 2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). As provided above, the references cited, alone or in combination, include no such teaching,

suggestion or motivation.

Furthermore, and as provided in MPEP 2143.02, a prior art reference can be combined or modified to reject claims as obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Additionally, it also has been held that if the proposed modification or combination would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. Further, and as provided in MPEP-2143, the teaching or suggestion to make the claimed combination and the reasonable suggestion of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). As can be seen from the forgoing discussion regarding the disclosures of the cited references, there is no reasonable expectation of success provided in any of the references.

As the USPTO Board of Patent Appeals and Interferences has held, "The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without benefit of appellant's specification, to make the necessary changes in the reference device." *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ351, 353 (BD. Pat. App. & Inter. 1984).

As the Federal circuit has stated, "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art

suggested the desirability of the modification.” *In re Fritch*, 972 F.2d 1260,1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992). Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor. *Para-Ordance Mfg. v. SGS Importers Int’l, Inc.*, 73 F.2d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995).

It is respectfully submitted that for the foregoing reasons, claims 1-10 are patentable over the cited reference(s) and thus, satisfy the requirements of 35 U.S.C. §103. As such, these claims allowable.

OTHER MATTERS

Applicant submitted an IDS dated March 9, 2001 for consideration by the Examiner that listed two Japanese patent documents. The PTO-1449 that was attached to the above-referenced Office Action, however, does not correspond to the PTO-1449 that was included with this IDS. Rather, the PTO-1449 enclosed with the Office Action indicates that it is for another patent application (*i.e.*, different USSN; USSN 09/809,821).

As such, Applicants request that the USPTO forward the copy of the initialed PTO-1449 corresponding to the PTO-1449 included with the IDS dated March 9, 2001. Applicants also respectfully request the Examiner to call the undersigned collect and the below number in the event that this IDS has not been received by the Examiner and thus needs to be again submitted by Applicants for the Examiner’s consideration.

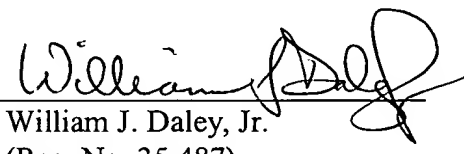
Applicant: Akira Sakaigawa, et al.
U.S.S.N.: 09/802,821
RESPONSE TO OFFICE ACTION
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It is respectfully submitted that the subject application is in a condition for allowance.
Early and favorable action is requested.

Applicants believe that additional fees are not required for consideration of the within
Response. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed
for any excess fee paid, the Commissioner is hereby authorized and requested to charge Deposit
Account No. **04-1105**.

Respectfully submitted,
Edwards & Angell, LLP

Date: August 10, 2004

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